

In the Claims

Please cancel claims 9-17.

Please add new claims 51-73.

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- 09870055 053001
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51. (New) A process for spherulizing irregularly shaped particles of coal fly ash or coal slag comprising the steps of:
- (a) delivering a feedstock of irregularly shaped particles of coal fly ash or coal slag to a drop tube having an upper portion, a central portion, and a lower portion;
 - (b) dropping the irregularly shaped particles into said upper portion of said drop tube in a manner such that the irregularly shaped particles flow in a substantially vertical downward path through said drop tube as individualized particles;
 - (c) heating the irregularly shaped particles to a sufficient temperature by providing heat to said central portion of said drop tube to cause at least the outer surface of the irregularly shaped particles to melt such that a majority of the irregularly shaped particles become spheroidal particles due to surface tension at the outer surface; and
 - (d) allowing the spheroidal particles to cool within said lower portion of said drop tube.
52. (New) The process of claim 51 wherein the step of delivering comprises delivering said feedstock of irregularly shaped particles having a diameter of 0.001 to 10 mm.
53. (New) The process of claim 52 wherein the step of delivering comprises delivering said feedstock of irregularly shaped particles having a diameter of 0.1 to 1 mm.
54. (New) The process of claim 51 wherein the heating step comprises heating said central portion of the drop tube to a temperature of 1000°C to 1700°C.

55. (New) The process of claim 51 wherein the step of heating and allowing said spheroidal particles to cool comprises generating spheroidal particles having a hardness of 478 HV to 551 HV.
56. (New) The process of claim 55 wherein the hardness of the spheroidal particles allows the spheroidal particles to be used in a procedure requiring small, hardened, spheroidal material.
57. (New) The process of claim 56 wherein the procedure is shot peening.
58. (New) The process of claim 56 wherein the procedure is polishing.
59. (New) The process of claim 56 wherein the procedure is sand blasting.
60. (New) The process of claim 56 wherein the procedure is filtering.
61. (New) The process of claim 51 further comprising crushing said spheroidal particles.
62. (New) The process of claim 61 wherein said crushed spheroidal particles are suitable for use as roofing granules.
63. (New) The process of claim 61 wherein said crushed spheroidal particles are suitable for use as an abrasive.
64. (New) The process of claim 51 wherein the step of heating and allowing said spheroidal particles to cool comprises generating spheroidal particles wherein at least 90% of the particles are substantially spheroidal.

65. (New) The process of claim 64 wherein 30% or less of said spheroidal particles are in the form of a duplex.
66. (New) The process of claim 65 wherein 70% or more of the duplexes are dissociated upon handling.
67. (New) The process of claim 51 wherein the steps of delivering, dropping, and heating occur in a drop tube that is of equal width at the upper portion, the central portion, and the lower portion.
68. (New) The process of claim 51 wherein the step of delivering said feedstock of irregularly shaped particles into the drop tube comprises delivering said feedstock using a vibrating device.
69. (New) The process of claim 51 wherein the step of delivering comprises the steps of:
- (a) feeding irregularly shaped particles to a feed tube oriented substantially vertically and having a substantially closed lower terminal portion with a discharge port substantially centered on the vertical axis of said feed tube; and
 - (b) intermittently rapping said feed tube to cause said particles to discharge from said feed tube in a substantially vertical downward path as individualized particles.
70. (New) The process of claim 69 wherein intermittently rapping comprises rapping at a rate and energy sufficient to cause the particles to discharge continuously.
71. (New) The process of claim 51 wherein heating said feedstock of coal fly ash or coal slag comprises heating said feedstock of coal fly ash or coal slag which comprise material that generate H_2O , NO, NO_2 , SO_3 , CO_2 , or mixtures thereof.

72. (New) A process for spherulizing and hollowing irregularly shaped particles of coal fly ash or coal slag comprising the steps of:
- (a) delivering a feedstock of irregularly shaped particles of coal slag or coal fly ash to a drop tube having an upper portion, a central portion, and a lower portion;
 - (b) adding to the feedstock a material which on heating generates H_2O , NO , NO_2 , SO_3 , CO_2 , or mixtures thereof;
 - (c) dropping the irregularly shaped particles into said upper portion of the drop tube in a manner such that said particles flow in a substantially vertical downward path through the drop tube as individualized particles;
 - (d) heating the irregularly shaped particles to a sufficient temperature by providing heat to the central portion of said drop tube to cause at least the outer surface of the irregularly shaped particles to melt such that a majority of the irregularly shaped particles become spheroidal particles due to surface tension at the outer surface;
 - (e) forming hollow regions within the spheroidal particles by heating due to the presence of H_2O , NO , NO_2 , SO_3 , CO_2 , or mixtures thereof; and
 - (f) allowing the spheroidal particles to cool within the lower portion of the drop tube.
73. (New) A process of forming substantially spheroidal particles from coal slag or coal fly ash, the process comprising steps of:
- (a) delivering irregular particles of coal slag or coal fly ash to an upper opening of a drop tube;
 - (b) dropping the irregular particles in a substantially vertical downward direction through the drop tube;
 - (c) heating the irregular particles as they drop through the drop tube to a sufficient temperature to spherulize at least 50% of the irregular particles; and
 - (d) cooling the spherulized particles, after heating, while the spherulized particles continue dropping through the drop tube

SUMMARY

Examination of these above-presented claims is requested. The Examiner is invited to contact the undersigned representative if it will facilitate prosecution of this application.

Respectfully Submitted,

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